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Pregnancy outcomes in Substance Misusing Pregnant Women: a 10-year Retrospective Study

Dr Anna Maria Vella (Malta)^(a,b) Professor Charles Savona Ventura (Malta)^(c); Dr Kim Wolff (UK)^(d).

- a) Principle Medical Officer, Sedqa, National Agency for Addiction, Substance Misuse Out-Patients Unit, St Luke's Hospital, Guardamangia, Malta.

E-mail address: avella3@go.net.mt. Mobile number: 00356 79048444.

Work Address: Substance Misuse Outpatients Unit, St Luke's Hospital, Guardamangia, Malta.

- b) PhD student, King's College London, Institute of Pharmaceutical Science, London, UK.

- c) Head of Department of Obstetrics and Gynaecology, Faculty of Medicine & Surgery, University of Malta

- d) Reader in Addiction Science and Post Graduate Education, King's College London, Institute of Pharmaceutical Science, UK.

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Maltese substance misusing mothers have significantly different socio-biological characteristics from mothers in the general population which seem to impact on neonatal outcomes.

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Abstract

Objectives: The aim of the study was to identify the prevalence and sociobiological characteristics of Maltese pregnant substance misusing mothers (SMM) as compared to the general maternity population.

Methods: All SMM attending the national Substance Misuse Outpatients Unit and receiving methadone during 2000-2009 were included in the study (n=182). The socio-biological characteristics of the pregnant women and their newborns were statistically compared with a control group (n=329) randomly selected from the general maternity population from the national obstetric database. SPSS was used to compare and analyse the data.

Results: The prevalence of SMM receiving care was 0.43%. SMM were significantly younger ($P<0.0005$), out-of-wedlock ($P<0.001$), multiparous ($P<0.001$) and cigarette smokers ($P<0.001$). SMM sought antenatal care later in gestation ($P=0.013$). Neonates of the SMM had a lower birth weight ($P<0.005$) and had smaller head circumferences ($P=0.03$).

Conclusions: SMM have significantly different socio-biological characteristics from mothers in the general Maltese population which seem to impact on neonatal outcomes.

Introduction

The degree of use of illicit substances such as cocaine, heroin and cannabis during pregnancy has increased over the last decades, especially in the younger population. An estimated 30,000 pregnant women use illicit opioids each year in the European Union (Gyarmathy et al., 2009) According to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), data on the prevalence of drug use among pregnant women is not available for most European countries; and where available, often comes from isolated studies using various methodologies making the observations not readily comparable (EMCDDA 2012). In an Ibiza Hospital, 16% of mothers giving birth had used illicit drugs during the third trimester of their pregnancy when assessed by a hair analysis although only 2% of the mothers had reported drug use during their pregnancy (EMCDDA 2012). In Latvia, the National Registry of mothers at Childbirth in the Czech Republic reported a prevalence of 1.8% of illicit drug use among over 1 million mothers between 2000 and 2009. However, only 0.2% and 0.8% of mothers delivering live births or stillbirths respectively reported illicit drug use (EMCDDA 2012).

In Malta, 15-25 newborns out of an average of 4000 live births annually (0.4-0.6%) are reportedly exposed to opioids and/or cocaine (Sedqa - The National Maltese agency against dependencies: internal unpublished data). Although data about pregnant substance-misusing women in Malta, has been methodically collected for more than 10 years by the National Obstetric Information System (NOIS) Register and Sedqa, little has been written about this special population. According to the last national Census, the Maltese population in 2011 consisted of 416,055 inhabitants with a male: female ratio of 1000:1008 (Census of population and housing in Malta 2012). A previous study carried out in this population during 1998-2002 showed that the proportion of reported substance misusing mothers (SMM) was

0.24% (Savona-Ventura, 2004). The present study, using a more comprehensive data collection system, sought to review the prevalence of SMM and compare the socio-biological characteristics and obstetric outcomes of pregnancy in SMM to non-drug misusing mothers between 2000 and 2009 in order to identify any differing trends between the two groups.

Methods

All Maltese SMM attending the Substance Misusing Out-Patients Unit, (SMOPU) run by Sedqa, and who were pregnant and gave birth between the years 2000-2009 ($n = 182$) were compared with a randomized representative sample of the general Maltese maternal population delivering during the same period ($n = 329$). The randomized sample was made available by the Department of Health Information and Research from the NOISR which records all maternities occurring on the Islands. It accounted for 0.9% of all maternities. The SMM were all prescribed a daily dose of methadone linctus (range 20 – 100 mg, prescribed concentration of 1 mg/ml). Use of illicit substances was also noted: those common in Malta are heroin, cocaine 3,4-methylenedioxy-*N*-methamphetamine (MDMA/ Ecstasy) and cannabis. It was not possible to differentiate poly drug usage in the retrospective data.

The socio-biological characteristics and obstetric outcomes of both groups were compared; including maternal age at delivery, marital status, parity, mother's educational background, cigarette use and mode of delivery. Infant data up to 30 days after delivery was also similarly compared. Infant data included birth weight and head circumference, the Apgar score at 1 and 5 minutes, the feeding methods employed and the length of hospital stay.

Ethical approval for the study was granted by the University of Malta Research Ethics Committee. The Department of Health Information and Research further gave its approval to access its national data-base. SPSS (version 21) was used to compare and analyse the data. Data was assessed using chi square analysis and the level of significance employed was 0.05. Other tools used were the one-way ANOVA test, Independent Samples T-test and Logistic Regression.

Results

In the ten-year study period investigated, i.e., 2000-2009, there were a total of 35,362 pregnancies of which 182 (0.43%) SSM attended Sedqa. The SMM were generally younger (mean age 25 ± 5.4 years) when compared to Maltese mothers who had not misused substances (28.2 ± 5.6 years. $n = 329$; $t = 6.225$, $P < 0.001$). The mean age of the first pregnancy, was also documented. In SMM it was similarly lower than that in the general population (21.9 ± 4.2 years $n = 72$ vs. 25.8 ± 5.2 years: $n = 166$; $P < 0.001$). SMM were significantly more likely to be out-of-wedlock than their non-abuser counterparts ($P < 0.001$) (Table I). The SMM had significantly higher parity ($P = 0.001$) with an average of 1.07 ± 1.11 children (range 1 to 4) when compared to the general population who had 0.73 ± 5.42 children (range 1 to 4). The educational background was documented and SMM were found to be less likely to have completed post-secondary education. A greater proportion of SMM left the educational system at primary school level ($P = 0.007$) (Table I).

SMM were more likely to smoke cigarettes regularly, with more than half ($n = 99$; 54.7%) smoking more than 3 cigarettes daily (control: $n = 10$; 3.1%). A further 6.6% ($n = 12$) of SMM admitted to smoking ≤ 3 cigarettes per day (control: $n = 4$; 1.2%). SMM reported a significantly greater likelihood of continuing smoking during their pregnancy than their counterparts ($P < 0.001$) (Table I). Only one SMM admitted to problematic alcohol use, no woman in the control group reported abusing alcohol. The SMM were all in treatment at the SMOPU and prescribed methadone (range from 20 -100 ml): some mothers also used illicit drugs in addition to their methadone prescription, while yet others were poorly compliant taking methadone on certain days and missing their dose on other days as recorded in their medical notes.

SMM were more likely to seek professional antenatal advice later in pregnancy than mothers from the general population (mean: 21.2 ± 20.4 weeks; range 18.2 to 24.2 weeks vs. 17.0 ± 17.1 , range 15.1 to 18.8 weeks, P value= 0.013). The maternal body weight at term was significantly lower in SMM than in mothers from the general population (73.7 ± 14.7 kg, range 70.9-76.6 kg vs. 77.2 ± 14.1 kgs; range: 75.3 – 79.0 kg; $P = 0.04$) (Table I). This difference persisted even when the maternal weight was corrected for the eventual birth weight of the child. A higher proportion of SMM were predicted and investigated antenatally for a small-for-gestational age infant (13.7% vs. 7.9%, $P = 0.036$). There were three SMM who suffered from hypertensive disease during pregnancy in contrast to none of the controls. There were no statistical differences in the proportions of SMM mother requiring Caesarean section compared to the general population (73.5% vs. 70.5%, $P = 0.52$). The SMM also showed no significant difference in their choice of analgesia during labour (none or inhalational 79.1% vs. 72.7%; opioid \pm inhalational 17.0% vs. 24.9%; regional alone or in combination 3.8% vs. 2.4%, $P = 0.11$). However, the mean gestational age of delivery of SMM pregnancies was significantly lower than that in controls 33.3 ± 2.0 vs 34.0 ± 1.6 , $P = 0.003$).

Infants born to SMM had a lower mean birth weight than those born to the general population ($P < 0.0005$). The difference in birth weight between the two groups persisted even when corrected for the degree of cigarette smoking (Table II). The mean size of the head circumference of the infants born to SMM was smaller than their counterparts born to the general population ($P = 0.003$) (Table II). The Apgar scores after 1 and 5 minutes for the infants born to SMM were significantly lower than the Apgar values of infants of the non-abusers ($P = 0.014$ after 1 minute; $P < 0.001$ after 5 minutes). Infants of SMM had a significantly longer hospital stay ($P < 0.001$) and were less likely to be breastfeed than their

counterparts (Table II). The infants born to SMM all survived the first four weeks of life. In contrast, there were three stillbirths and two early neonatal deaths registered in the control group [perinatal mortality rate: 15.2 per 1000 total births].

Discussion

The present study has suggested that over the ten-year period, 2000-2009, the proportion of pregnant SMM was 0.43%. This rate appears to have doubled from the figure of 0.24% reported in the same population during the period 1998-2002 (Savona-Ventura, 2004). While this near double increase may reflect an increase in drug abuse in the reproductive age, it is much more likely that SMM are coming forward to avail themselves of the Sedqa services more than previously. Sedqa services are provided with complete confidentiality without any recourse or mandatory reporting to the law enforcing agencies.

SMM have been shown in this retrospective study to have specific sociobiological characteristics compared to their non-substance misuse counterparts. SMM were thus significantly younger than the general pregnant population and had their first pregnancy significantly earlier. This finding has been observed elsewhere in other European countries and in North America (Cleary et al., 2011). These differences may be attributed to many possible causes. One could hypothesise that under the influence of psychoactive substances, young girls are less prone to use contraceptives or more likely to engage in more risky behaviour (Thangappah, 2000). They may also be using sex to pay for their habit.

It should be noted that in Malta termination of pregnancy for whatever reason remains illegal, though women with unwanted pregnancies can choose to have their pregnancy terminated overseas. This option may not be a viable one for SMM because of financial difficulties. Furthermore, Maltese SMM were often single, lacking the support of a partner (Fischer & Kopf, 2007) and as observed in other studies were unsure of the identity of the child's father

and/or were involved in prostitution (Savona-Ventura, 2004). They were more likely to be multiparous. While this could reflect resorting to prostitution to pay for their needs, it may be a reflection of the social benefits system available in the Maltese Islands. Unmarried Maltese women qualify for financial support from the Department of Social Services, and a significant proportion of women delivering out of legal wedlock remain single to avail themselves of the financial benefits. In such cases, the child would have no legal father and no legal rights to paternal support. (https://secure3.gov.mt/socialpolicy/social_benefits/sa/soc_assist_single_par/info_soc_assist_single_par). It has been previously reported in other studies that siblings of the same SMM often have different fathers (Black et al., 2012) and often face financial hardships (Roberts, 2003). A SMM who is single and having to support herself and her child contributes to difficulties that are made worse by poor educational attainment (Rini et al; 1999). The Maltese SMM have been shown to have attained a lower educational level.

Maltese SMM also had significant medical care issues. They booked their pregnancy significantly later than the general control population, as has been previously reported in the literature (Cleary et al; 2011, Savona-Ventura, 2004, Thangappah, 2000). Consequently, any medical or obstetric problem arising during pregnancy would be identified and addressed late. The reasons for the delay in booking are unclear, especially since the Maltese National Health Service provides free medical services for all stages of pregnancy. It is thought probable that late booking may be caused by a failure to recognise that conception has occurred (Jones et al; 2011) as a result of opioid induced menstrual irregularity (Grönbladh & Öhlund, 2011). Once in treatment, illicit opioid use may decrease, reinstating ovulation, and increasing the risk of unplanned pregnancy (Fischer & Kopf, 2007).

The present study has shown that SMM weighed less at the end of pregnancy than their counterparts. Women on opioids do tend to neglect their overall health and nutrition starting

pregnancy in a relatively ‘malnourished’ state. Mothers on opioids appear to be particularly susceptible to hyperemesis gravidarum in the first trimester further contributing to their malnutrition. Even afterwards, their eating habits are not regular (Thangappah, 2000). The low maternal weight at term could also have been contributed by the observed reduction in mean birth weight of the infant.

Fetal growth effects after opioid exposure in utero, such as lower birth weight, smaller head circumference and lower Apgar scores were demonstrated in this study. These may be a direct opioid effect but other confounding variables could also have contributed to the observed fetal adverse outcomes. Variables influencing fetal growth and gestational age at delivery include smoking, multiple drug use and low socioeconomic status: all factors being prevalent in SMM in the present and previous studies (Cleary et al; 2011, Fischer & Kopf, 2007, Simpson, 1957). While heroin has been associated with retarded fetal growth (Bada et al 2002, Minnes et al; 2011, Minozzi et al; 2008), the use of methadone has been shown to be associated with higher birth weights when compared to women who continued to use heroin. It has further been shown to HELP prevent premature labour so that fetuses exposed to methadone had a higher birth weight and less morbidity than heroin exposed babies (Finnegan et al; 2010). This was attributed to the fact that SMM on methadone maintenance had better antenatal care. It is relevant to note that in the present study, the SMM babies weighed less and were smaller than those from the general population irrespective of reported smoking habits. No information was unfortunately available in the study in respect to opioid use during pregnancy other than methadone. The associated low Apgar may be explained by the direct effect of opioids on the new-born’s brain which affects its respiratory system (Angeles et al; 2007).

Finally, despite general encouragement towards breastfeeding, since it has been found to decrease the occurrence and severity of the Neonatal Abstinence Syndrome (Jansson et al; 2004, MacCarthy & Posey, 2000, O'Connor et al; 2013, Pritham, 2013), fewer SMM chose to breast feed when compared to the general population. SMM neonates also had a longer hospital stay in excess of the standard Maltese departmental policy of keeping these infants hospitalized for a minimum of seven days.

Conclusions

This retrospective study has confirmed some of the findings described in other populations. SMM tend to be younger, out-of-wedlock, of lower educational background, multiparous, and more likely to smoke cigarettes. Their newborns were more likely to have lower Apgar scores at one and 5 minutes after birth, tended to be artificially fed and had a longer hospital stay. Contradictory to other previous reports, the SMM newborns tended to have low birth weights even though their mothers were receiving methadone irrespective of the degree of cigarette smoking: unreported illicit drug use may have been a confounding factor. This can be considered to be the main limitation of the present study since the NOIS data collection system does not require documentation of other medications or illicit drug use.

In order to improve the treatment outcomes for pregnant SMM, care should be coordinated by multidisciplinary interventions, encompassing personal and social welfare, gynaecological and obstetric care, and care for drug use (Doggett et al; 2005, Fischer & Kopf, 2007, Terplan & Lui, 2007). The aim of such care is to reduce risk to the mother and child through the integrated collaboration of obstetricians, addiction counsellors, social workers, general practitioners and other health care specialists, to link drug treatment with other interventions aimed to help pregnant SMM (Gyarmathy et al; 2009, Wright & Walker, 2007)

Women who misuse drugs during pregnancy are an elusive population who often remain unidentified to practitioners and researchers and hence have generally not been well studied. SMM have definite socio-biological characteristics that should influence healthcare professional and public health officials to modify current health promotion strategies to better address this target population.

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Table I: Demographic data for control mothers (n = 329) and SMM (n = 182).

	SMM	Control	<i>P</i> value
Age at first pregnancy Mean age (years)	n=72 21.9 ± 4.2	n=166 25.8 ± 5.2	<i>P</i> < 0.001
Marital Status: Out of wedlock Married	n= 150 82.4% n= 32 17.6%	n=72 21.9% n=257 78.1%	<i>P</i> <0.001
Educational Status: Primary Secondary Post Secondary	n=2 1.1% n=52 28.6% n=0 0%	n=1 0.3% n=90 27.4% n=19 5.8%	<i>P</i> = 0.007
Cigarette Smoking: No Cigarettes ≤3 cigarettes >3 cigarettes	n=70 38.7% n=12 6.6% n=99 54.7%	n=310 95.7% n=4 1.2% n=10 3.1%	<i>P</i> < 0.001
Mothers booked pregnancy at hospital: Weeks (range)	21±20.4 (18.2 – 24.2)	17±17.1 (15.1 – 18.8)	<i>P</i> = 0.013
Number of offspring Mean (range)	1.07±1 (1-4)	0.73±5.42 (1-4)	<i>P</i> = 0.001
Mother's weight at term: (kg) Mean± SD (range)	73.7±14.7 (70.9 – 76.6)	77.2 ± 14. (75.3 ± 79.0)	<i>P</i> = 0.04

SMM= Substance Misusing Mothers

Table II: Infant outcomes of SSM (n = 182) and Control (n = 329) patient groups.

Parameter	SMM (n =182) Mean \pm SD (range)	Control (n=329) Mean \pm SD (range)	P value
Birth weight (gm):	2884.5 \pm 569.1 (2801.0– 2968.0)	3203.9 \pm 549.5 (3144.3 – 3263.5)	$P < 0.0005$
Birth weight of infants exposed to nicotine (gm):	2859.5 \pm 584.1 (2749.2 – 2969.9)	3180.6 \pm 499.1 (2892.5 – 3468.8)	$P = 0.05$
Birth weight of infants not exposed to nicotine (gm):	2933.1 \pm 544.4 Range:2803.3– 3062.9	3205.5 \pm 554.2 Range: 3143.5 – 3267.4	$P < 0.001$
Head Circumference (cm):	33.3 \pm 2.0 Range: 32.98 – 33.7	34.1 \pm 2.52 Range: 33.8 – 34.4	$P = 0.003$
APGAR after 1 minute (score out of 10)	8.31 \pm 1.81 Range: 8.04 - 8.58	8.63 \pm 1.1 Range: 8.51 - 8.75	$P = 0.014$
Gestational age (weeks)	33.3 \pm 2.0 (n = 117) Range: 26 - 39	34.0 \pm 1.6 (n = 256) Range: 24 - 39	$P = 0.003$
APGAR after 5 minutes (score out of 10)	8.74 \pm 1.43 Range: 8.53 - 8.95	9.12 \pm 0.58 Range: 9.06 - 9.18	$P < 0.001$
Breastfeeding (%) (Number in group)	19.5% (n = 35)	64.4% (n = 210)	$P < 0.001$
Hospital stay (days):	9.08 \pm 21.63 (5.92 - 12.25)	3.61 \pm 7.89 (2.75 - 4.48)	$P < 0.001$

SMM= Substance Misusing Mothers